

IN THE CLAIMS:

1. – 20. (Cancelled).

21. (New) A piston pump for pumping liquid comprising:
- a housing having a liquid inlet and a liquid outlet;
 - a piston located in said housing, remote from said liquid outlet;
 - a seal provided between said piston and said housing to divide said housing into a first chamber and a second chamber;
 - valve means to control passage of liquid from said first chamber through said piston and into said second chamber;
 - a drive shaft operatively connected to the piston for reciprocal motion therewith, said drive shaft reciprocally movable in first and second strokes thereof;
 - drive means to reciprocally drive said drive shaft and said piston, said drive means comprising:
 - a support,
 - a motor mounted on said support,
 - a crank driven by said motor,
 - a crank arm connected to said crank and operatively connected with said drive shaft to transfer drive to said drive shaft,
 - a longitudinally extending member provided on said support, said longitudinally extending member extending substantially parallel to the direction of reciprocal motion of said drive shaft, and
 - constraining means provided at the operative connection of said crank arm and said drive shaft, said constraining means is constrained by said longitudinally extending member and movable therealong, and said constraining means and said longitudinally extending member constrain movement of said crank arm such that said crank arm does not impart any substantial movement to said drive shaft in a direction sideways to the direction of reciprocal motion of said drive shaft, and
 - the cross-sectional area of the drive shaft is approximately the same as the cross-sectional area between the drive shaft and the housing;

wherein, in use, in said first stroke of the drive shaft, liquid is displaced from the first chamber into the second chamber through said valve means and liquid is discharged from said second chamber via said liquid outlet, and in said second stroke of said drive shaft, said valve means is closed and liquid is displaced from said second chamber and discharged from said second chamber via said liquid outlet, and wherein substantially equal volumes of liquid are displaced in said first stroke and said second stroke of said drive shaft.

22. (New) A piston pump as claimed in claim 21, wherein said constraining means comprises a wheel movable within said longitudinally extending member.
23. (New) A piston pump as claimed in claim 21, wherein said longitudinally extending member comprises a channel member.
24. (New) A piston pump as claimed in claim 21, wherein the drive shaft has a cross-sectional area of between 40% and 60% of that of the housing.
25. (New) A piston pump as claimed in claim 24, wherein the drive shaft has a cross-sectional area of between 45% and 55% of that of the housing.
26. (New) A piston pump as claimed in claim 21, wherein said liquid outlet is provided adjacent a closed end of said housing remote from the piston, the closed end of the housing having an aperture provided therein arranged to receive the drive shaft therethrough, and further seal means provided between the drive shaft and the closed end.
27. (New) A piston pump as claimed in claim 26, wherein the drive shaft is hollow to define a cavity therein.
28. (New) A piston pump as claimed in claim 27, wherein the cavity is filled with a substance that is buoyant compared to the liquid being pumped.
29. (New) A piston pump as claimed in claim 27, wherein the drive shaft is hollow to define a plurality of cavities.

30. (New) A piston pump as claimed in claim 29, wherein the drive shaft is formed from a plurality of lengths of conduit, adjacent conduits being joined at a connector comprising a central portion having an outer surface and two end portions arranged to receive the ends of adjacent conduits thereon, whereby the outer surface of the central portion is contiguous with that of the conduits.

31. (New) A piston pump as claimed in claim 21, wherein a disc is provided adjacent an end of said piston, proximate said valve means, and said seal is provided on said disc.

32. (New) A piston pump as claimed in claim 21, wherein said piston is provided with apertures such that liquid is able to pass from said first chamber via said valve means into said piston and through said apertures into said second chamber.

33. (New) A piston pump as claimed in claim 21, wherein said constraining means is connected to said crank arm.

34. (New) A piston pump as claimed in claim 21, wherein said drive shaft, or a drive shaft extension, extends through a stuffing box means and is connected to said crank arm.

35. (New) A piston pump for pumping liquid comprising:
a housing having a liquid inlet and a liquid outlet;
a piston located in said housing, remote from said liquid outlet;
a seal provided between said piston and said housing to divide said housing into a first chamber and a second chamber;
valve means to control passage of liquid from said first chamber through said piston and into said second chamber;
a drive shaft operatively connected to the piston for reciprocal motion therewith, said drive shaft reciprocally movable in first and second strokes thereof;
drive means to reciprocally drive said drive shaft and said piston, said drive means comprising:
a support,
a motor mounted on said support,

a crank driven by said motor,
a crank arm connected to said crank and operatively connected with said drive shaft to transfer drive to said drive shaft,

a longitudinally extending member provided on said support, said longitudinally extending member extending substantially parallel to the direction of reciprocal motion of said drive shaft, and

a connector connecting said crank arm and said drive shaft, said connector is constrained by said longitudinally extending member and movable therealong, and said connector and said longitudinally extending member constrain movement of said crank arm such that said crank arm does not impart any substantial movement to said drive shaft in a direction sideways to the direction of reciprocal motion of said drive shaft, and

the cross-sectional area of the drive shaft is approximately the same as the cross-sectional area between the drive shaft and the housing;

wherein, in use, in said first stroke of the drive shaft, liquid is displaced from the first chamber into the second chamber through said valve means and liquid is discharged from said second chamber via said liquid outlet, and in said second stroke of said drive shaft, said valve means is closed and liquid is displaced from said second chamber and discharged from said second chamber via said liquid outlet, and wherein substantially equal volumes of liquid are displaced in said first stroke and said second stroke of said drive shaft.

Amendment
Serial No. 09/831,615

IN THE DRAWINGS:

Enclosed please find replacement sheets for Figures 1A through 3. These replacement sheets include the same drawings that were previously submitted. The only difference in the replacement sheets is that the reference numeral for pump 10 and plug 48 are shown.